

Original

Evaluación del consumo de alimentos en una población de universitarios españoles según patrones de Dieta Mediterránea

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Resumen

Fundamentos: La Dieta Mediterránea es un conjunto de recomendaciones nutricionales inspiradas en la forma en que tradicionalmente se ha comido en los países mediterráneos. El objetivo del estudio fue investigar los patrones de consumo de alimentos en estudiantes que vivían en régimen de pensión completa en residencias universitarias, determinando si se ajustaban a las recomendaciones de la Dieta Mediterránea. También se analizó la influencia del número y género de los residentes y tipo de restauración sobre la ingesta.

Métodos: Se estudiaron 163 estudiantes, alojados en 20 residencias universitarias de Madrid en régimen de pensión completa. Los hábitos alimentarios fueron evaluados mediante cuestionarios de frecuencia de consumo de alimentos y las características de las residencias se preguntaron a los responsables de las mismas.

Resultados: Los jóvenes no seguían las recomendaciones propuestas para la Dieta Mediterránea. Concretamente, comían más cantidad de carne, dulces y aperitivos que la recomendada, y por el contrario su dieta era pobre en frutas, cereales, patatas y frutos secos. El tamaño de la residencia influía en el consumo de algunos grupos de alimentos.

Conclusiones: Los jóvenes españoles están cambiando sus hábitos de consumo, alejándose del patrón de la Dieta Mediterránea y de los posibles beneficios que aporta.

Palabras clave: *Dieta Mediterránea. Estudiantes. España.*

Introduction

The Mediterranean Diet is a way of eating inspired by the traditional dietary patterns of Greece, Southern Italy and Spain¹. At the end of 2010, it was inscribed in the UNESCO Representative List of the Intangible Cultural Heritage of Humanity². This diet puts emphasis on eating

EVALUATION OF FOOD CONSUMPTION ACCORDING TO MEDITERRANEAN DIET IN A SPANISH UNIVERSITY POPULATION

Abstract

Background: The Mediterranean diet is a modern nutritional recommendation originally inspired by the traditional dietary patterns of Mediterranean countries, mainly Greece, Italy and Spain. The aim of this study was to investigate the food consumption pattern of the student Spanish population living at full board in university colleges, and to evaluate if they follow the consumption advisories for the Mediterranean diet. The influence on intake of number, gender of residents and type of restoration was also analyzed.

Methods: The sample consisted of 163 students lodged at full board in university residences from Madrid (Spain). The dietary habits were evaluated by a self-administered food frequency questionnaire, and the residence characteristics were asked to the corresponding headmaster.

Results: Young people studied did not adhere to the recommendations of consumption for the Mediterranean diet. Specifically, they ate more meat, sweets and snacks than recommended, and their diet was poor in fruits, cereals, potatoes and dried fruits. The residence size had an influence on the average consumption of certain food groups. **Conclusion:** The results indicated a possibility of changing nutritional habits among the young Spanish population moving away from the benefits of the Mediterranean diet.

Key words: *Diet Mediterranean. Students. Spain.*

high amounts of olive oil and olives, fruits, vegetables, cereals (mostly unrefined), legumes and nuts, moderate amounts of fish and dairy products, and low quantities of meat and meat products³⁻⁵. The pattern is represented in the Mediterranean Diet Pyramid, a graphic indication to represent that daily intake should be mainly composed of foods of vegetable origin such as: cereals, fruits, vegetables, legumes and nuts, located at the base of the pyramid. With a decreasing intake, in frequency and quantity, a step up in the pyramid is: dairy products, potatoes, poultry and eggs; on the top, occasional intake of sweets, meat and its derivatives⁶. The Spanish Society of Community Nutrition –SENC– has revised in the latest years the

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Mediterranean diet pyramid representation, indicating the relative proportions and consumption frequency of servings for the main food groups that constitute the Mediterranean dietary pattern, as well as the incorporation of cultural and healthy lifestyle elements⁷.

The Mediterranean diet has been widely reported to be a model of healthy eating for its contribution to a favorable health status and to a better quality of life⁸⁻¹⁰. It has been extensively associated with favorable health outcomes, mainly in relation to mortality, cardiovascular disease risk factor¹¹ and cancer¹².

Some researchers have suggested that in the latest years the Mediterranean population, including the Spanish population, is moving away from Mediterranean diet pattern^{13,14}. For example, a recent study conducted on 565 Italian adolescents aged 12 to 19 found that only 14 percent had scores that indicated a high adherence to the Mediterranean diet¹⁵. In Spain, another study conducted on 284 students, enrolled in the

Albacete campus of the University of Castilla La Mancha, showed that only the 5.3 percent had a high adherence to the Mediterranean diet and that the 96.1 percent scored "poor" or "needs improvement" in the quality of their diet¹⁶.

Changes that have occurred in the Mediterranean diet include reduced calorie intake and expenditure, increased consumption of foods with low nutrient density (soft drinks, candies, sweets, etc.) and different food processing techniques (i.e. refining of flour)^{17,18}. The abandonment of traditional healthy habits and the emergence of new lifestyles associated with socioeconomic changes and food globalization pose important threats to the preservation and transmission of the Mediterranean diet to future generations^{19,20}.

Therefore, the present study aims to investigate and assess the food consumption pattern of the young student population living at full board in university residences from Madrid, and to evaluate if they followed the recommendations proposed by the SENC for the Mediterranean diet and how certain characteristics of the university residences, such as size, gender and type of restoration could exert an influence.

Material and methods

Study desing

An across sectional survey was conducted on 163 young students at the Complutense University in the city of Madrid (Spain), during the second term of the academic year 2014–2015. The sample chosen was very homogeneous as all participant students had a similar age and socioeconomic status.

Participants

All university colleges and residences registered at Universidad Complutense de Madrid-UCM (Spain) were

contacted. Only in 20 out of the total registered number of residences (n = 38) full board was available. Firstly, the research team contacted the corresponding residences headmasters, who were provided with detailed information of the study. Once permission was given, all resident students (n = 1784) were properly informed in different informative sessions and those willing to participate (n = 163) were recruited for the study.

The 163 subjects (48 females, 110 males and 5 persons who forgot to record their gender) involved in the study (18–28 years old) lived at eight different university residences in full board. The direct contact among students, the responsible persons for the residences and the research team was by email, phone or personal interviews. Students voluntarily participated in the study. All participants were informed about the nature of the study and provided their written informed consent. This study follows the principles of the Declaration of Helsinki.

Food consumption assessment

A Food Frequency Questionnaire (FFQ) of 112 items was self-administered to assess dietary habits. This questionnaire was adapted from the one used in the Predimed Study, which was validated in the Spanish population^{21,22}. In this questionnaire the weekly consumption of dairy products, lean meats, poultry, eggs, fish, legumes, vegetables, fruits, cereals, potatoes, dried fruits, fatty meats, sausages, snacks and olive oil was evaluated.

The original template was slightly modified and simplified in order to facilitate its correct comprehension and filling by the university participants. Mainly, some food categories are put together and, in brief, the changes performed in the original PREDIMED-FFQ are as follows:

- Milk, different types were gathered together according to its fat content (whole, half-skimmed or skimmed milk), as they all belong to the same food group. Coeliac people and lactose intolerants were asked to estimate the consumption of lactose-free cow milk or of other vegetable milks (i.e. soybean, almond, hazelnut, rice, etc).
- Bakery products were not gathered but coeliac and gluten intolerant participants were asked to specify if they were consuming this type of products.
- Oil or different types of vegetable oil were gathered. Many university students do not know or cannot distinguish which type of vegetable oil they are eating. Moreover, the regular intake of olive oil is quite high in Spain.
- Margerine and butter were also put together. Even though most people know the difference, at least from a healthy point of view, in practice they are not able to distinguish which type of fat they are eating.
- Sauces were all united in only one question (same item).

- Fruit juices, only one type was specified, without considering type of processing or bottled fruit.
- As alcoholic drinks are not served at the colleges, the question on intake of alcohol and different types of wine was removed from the food frequency questionnaire.

The adaptations performed allowed the participants to be faster and more efficient when filling their questionnaires, without altering their answers.

The students were classified into three main groups: optimal, excessive, or poor according to type of consumption, as recommended by the SENC for each main food groups. Intake is considered as optimal when it fits the SENC's recommendations, excessive if it exceeds them and poor when it does not reach them. This information can be found on the SENC's web site⁶.

Characteristics of the university colleges

Regarding the number, two out of the twenty participant university colleges had less than 100 residents. According to population gender, three of the colleges were only for males, two only for females and three were mixed. With regard to type of restoration, six out of eight colleges cooked meals at their own kitchen and two had satellite kitchen.

Data analysis

Characteristics of the consumption for the main food groups by the university students are described as mean values (standard deviation) of the servings consumed per week. The Kolmogorov-Smirnov test was used to evaluate the normality of all continuous variables. Statistical differences in the mean weekly consumption of the main food

groups by sex and by type of consumption (poor, optimal or excessive), according to the recommendations of the SENC, were analyzed using one-way analysis of variance.

All statistical analyses were performed by using SPSS v.21 software. The level of significance was set at 5% for all tests.

Results

The descriptive most important characteristics for the diet of university students are shown in table I. It reports mean weekly consumption of main food groups and the type of consumption (poor, optimal or excessive) supported by the recommendations of SENC. A general point of view found is that the diet of male students was different to that of females. Male consumed more servings per week of fish [6.2 (5.5) vs 3.8 (3.6) servings/ week] and legumes [3.4 (2.7) servings/week vs 2.2 (1.2) servings/week] than female students, meanwhile female students consumed more vegetables [30.1 (22.2) servings/week vs 17.6(15.6) servings/week] and fruits [21.6 (17.3) servings/week vs 14.7 (13.8) servings/week]. Regarding the consumption frequencies by food groups, male and female students presented an excessive consumption of fatty meats, sausages, lean meats, poultry, eggs and snacks. However, the consumption of dried fruits, fruits, cereals and potatoes was poor in both genders. In addition, female students presented a poor consumption of legumes.

The figure 1 reports the consumption frequency for the main food groups as recommended by SENC and that found at the university colleges in this study. The main food groups in which there were more differences are: dried fruits, lean meats, poultry and eggs, fatty meats and sausages, and snacks.

The table II shows the degree of adherence to the Mediterranean diet for each main food group, according to different characteristics of university colleges, namely: num-

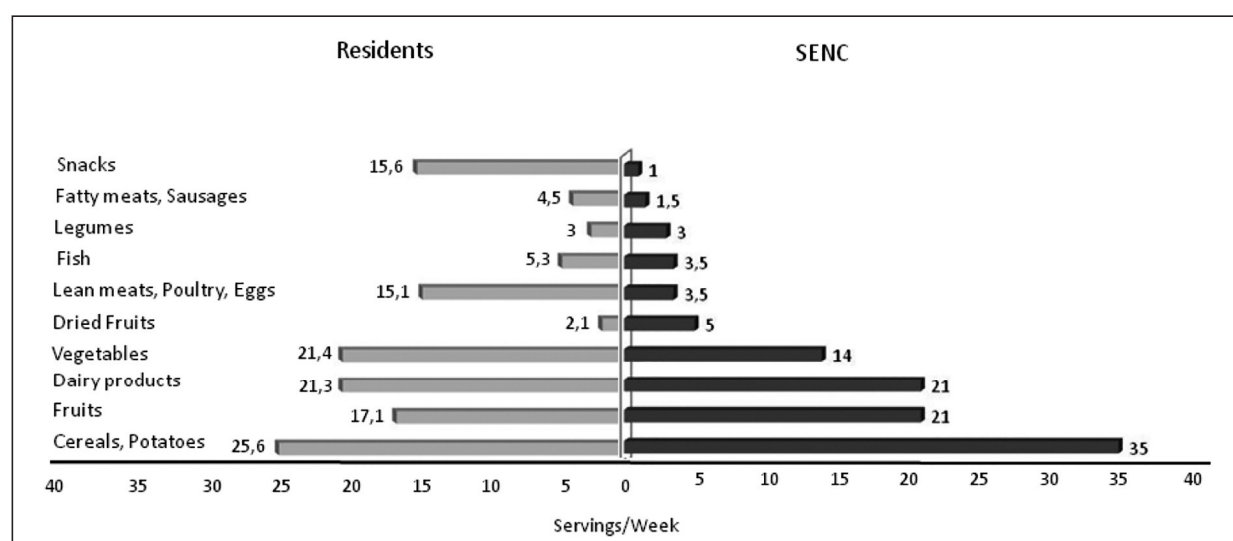


Fig. 1.—Consumption frequency for main food groups. In light grey colour, consumption frequencies in university colleges by residents and in dark grey colour, consumption frequencies recommended by SENC.

Table I
Characteristics for the diet of university students

	Mean weekly consumption				Poor consumption				Optimal consumption				Excessive consumption			
	Total	Men (n = 110)	Women (n = 48)	p	Total	Men	Women	p	Total	Men	Women	p	Total	Men	Women	p
Dairy products	Mean (SD) (servings/week) % Adequacy [n]	20.7 (11.8)	24.0 (12.8)	0.119	9.2 (3.4)	13.5 (9.6)	13.0 (8.7)	0.460	20.5 (4.5)	19.9 (4.5)	22.7 (3.9)	0.011	39.7 (11.2)	40.7 (11.5)	38.3 (11.6)	0.545
Lean meats, Poultry, Eggs	Mean (SD) (servings/week) % Adequacy [n]	15.2 (5.3)	14.8 (5.1)	0.407	1.5	-	1.5	-	4.0 (0.9)	4.5 (0.0)	3	-	15.6 (4.9)	15.6 (5.2)	15.4 (4.5)	0.640
Fish	Mean (SD) (servings/week) % Adequacy [n]	5.1 (4.1)	6.2 (5.5)	0.001	1.5 (0.9)	1.5 (0.9)	1.7 (0.8)	0.465	3.5 (0.4)	3.6 (0.4)	3.4 (0.4)	0.133	7.9 (4.3)	8.5 (5.9)	7.7 (5.0)	0.897
Legumes	Mean (SD) (servings/week) % Adequacy [n]	3.0 (2.4)	3.4 (2.7)	0.000	1.5 (0.6)	1.4 (0.8)	1.7 (0.5)	0.027	3.5 (0.4)	3.5 (0.4)	3.8 (0.2)	0.037	7.9 (3.6)	8.4 (3.8)	5.3 (0.8)	0.188
Vegetables	Mean (SD) (servings/week) % Adequacy [n]	21.3 (18.3)	17.6 (15.6)	30.1 (22.2)	7.9 (4.2)	7.7 (4.3)	8.7 (3.5)	0.550	30.6 (18.6)	28.3 (16.3)	34.7 (24.6)	0.112	-	-	-	-
Fruits	Mean (SD) (servings/week) % Adequacy [n]	17.1 (15.7)	14.7 (13.8)	21.6 (17.3)	10.5 (4.2)	10.5 (4.2)	10.5 (4.5)	0.977	39.6 (19.3)	43.3 (21.5)	35.8 (17.2)	0.267	-	-	-	-
Cereals, potatoes	Mean (SD) (servings/week) % Adequacy [n]	25.6 (15.4)	26.9 (17.8)	23.0 (8.6)	18.4 (5.7)	18.2 (6.1)	18.7 (5.1)	0.674	33.7 (4.4)	35.4 (4.4)	31.4 (3.3)	0.012	54.65 (10.4)	63.8 (17.8)	45.5 (2.8)	0.180
Dried Fruits	Mean (SD) (servings/week) % Adequacy [n]	2.2 (7.0)	2.6 (8.5)	1.4 (1.4)	0.8 (0.7)	0.7 (0.7)	1.0 (0.7)	0.015	4.2 (1.5)	4.3 (1.6)	3.9 (1.7)	0.630	29.0 (25.3)	33.3 (25.7)	7.5	-
Snacks	Mean (SD) (servings/week) % Adequacy [n]	15.6 (14.8)	14.6 (15.1)	18.6 (14.4)	-	-	-	-	1.04 (0.85)	1.2 (0.9)	0.9 (0.7)	0.752	18.0 (14.6)	17.3 (15.1)	20.2 (13.9)	0.278
Fatty meats, Sausages	Mean (SD) (servings/week) % Adequacy [n]	4.3 (3.8)	4.8 (5.2)	4.2 (3.0)	0.2 (0.2)	0.3 (0.2)	0.2 (0.3)	0.789	1.7 (0.4)	1.8 (0.5)	1.7 (0.4)	0.574	5.4 (3.9)	6.8.1 (5.8)	5.8 (2.8)	0.390
					2.7 [3]		4.2 [2]		36.4 [53]		33.3 [26]		60.9 [14]		62.5 [4]	

Values are expressed as mean (SD) of servings/week and percentage and number of persons who follow the recommendations of Mediterranean diet for each main food group. Significance level (P) was fixed at 0.05.

ber of residents; type of restoration and population gender. Statistically significant differences in the percentage and number of students following the recommendations of consumption proposed by the SENC, supporting the Mediterranean diet for legumes (45.5% vs 7.7%), fruits (12.9% vs 53.8), vegetables (50.0% vs 89.7%) and snacks (17.7% vs 2.6%), were found between colleges with more and less than 100 residents, respectively. Regarding the type of restoration, vegetable consumption is only different among residences that have their own kitchen as compared to those with satellite kitchen. Those residents lodged in colleges that have satellite kitchen could better follow the recommendations for vegetables consumption (80.0% vs 56.6%). In female colleges, the adherence to the Mediterranean diet in fruits and vegetables was higher than in male colleges. Opposite, the adherence to legumes was higher in male than in female colleges, and the adherence to fatty meats and sausages was higher in mixed gender colleges.

Discussion

In the present study, a homogeneous age sample of young students lodged in full board at different university colleges in Madrid was analyzed in order to study their adherence to the Mediterranean diet, according to the recommendations proposed by the SENC.

The main findings of this study indicate that these university residents were not entirely consistent with the recommendations of the SENC for the Mediterranean diet, and that there were gender differences in terms of feeding style (fig. 1 and table I). On the other hand, our results show how some features of the university colleges had an influence on the dietary patterns of the residents (table II).

In the latest years several authors have suggested that young population show an abandonment of traditional Mediterranean dietary patterns¹⁷ and that they are closer to Western dietary habits²³. This trend is seen in reduced consumption of fruits, vegetables, legumes and fish¹⁷. In 2011, Durá and colleagues analyzed a sample of 570 university students and concluded that approximately 72% of them need to improve their dietary pattern, because they had a low to intermediate adherence to the Mediterranean diet²⁴. In 2012, Ortiz-Moncada and colleagues found in their study that in students from the University of Alicante (Spain), the consumption of grains and derivatives was very deficient, whereas the intake of red meats and cold meats was excessive²⁵. More recently, in 2013, Miguez and colleagues found in a total sample of 726 Galician university students that there is a decrease in the consumption of vegetables, fish, whole-grain cereals and olive oil, and an increased consumption of meat²⁶. Our current findings extend these previous results, because we have found that the consumption patterns of the students who lived in the colleges were different from the recommendations proposed by the SENC for most of the main food groups. Specifically, figure 1 shows that the consumption of cereals and potatoes, dairy products, dried fruits and legumes is lower

in the students than in SENC recommendations, and instead there is an excessive consumption of snacks and meats. Dried fruits are a favorable alternative to unhealthy snacking within eating hours and to the high consumption of meat, and they are more in keeping with a healthy lifestyle. However, the consumption of dried fruits by the young population is scarce because these products are expensive and therefore they are not usually included in the menu at university halls. When analyzing by gender, we can observe that approximately 90% of the males and 56% of the females consumed little fruit, more than 50% of males had a poor vegetable consumption, and more than 80% of females consumed less legumes that recommended by the SENC. Regarding the consumption of olive oil in the current study, we must indicate that the participants did not know how to quantify properly the servings per week of this particular food item and consequently, they provided mismatched data. On the other hand, the Mediterranean diet typically includes a moderate intake of wine, usually red wine, but in this study the consumption of wine or alcohol was not evaluated because no alcoholic beverages are served at the university colleges.

Therefore, scientific evidence with regard to the relationship between dietary pattern in students and the characteristics of the university colleges is somewhat scarce. Indeed, to the best of our knowledge, there are no studies linking adherence to Mediterranean diet and characteristics of the university residences. However, there are some studies that assess food habits at university colleges in other countries. For example, a study conducted by Alves and colleagues in 2007 describes food practice among university students living in residence halls in Brazil²⁷. Students had inadequate intake of fruits and milk, 48% had no fruits in the day prior to the interview, 25% one fruit piece, and 27% more than one. As for milk, 39% did not have any in the 24 hours prior to the interview, 44% had one serving, and 17% had two or more servings. They found that 43% of the students think that having meals together has a positive impact on their food behavior²⁷. In the current study (table II), it can be seen that in colleges with a higher number of residents, and therefore having a greater chance of eating with company, the percentage of students that followed the recommendations for legumes and snacks consumption was higher than in those with fewer students, however, the percentage of students that followed the recommendations for fruit and vegetables consumption was less than desired. Hence, these results suggest that the number of university residents affected the way students eat, regarding adherence to the Mediterranean diet. Regarding the type of restoration, no significant differences were found in the percentage and number of people that followed the recommendations of Mediterranean diet for each main food groups, except for the group of vegetables. In this group it looks like that students who eat food prepared in a satellite kitchen can better follow the recommendations than those who eat prepared food at the colleges' own kitchen. These results support the idea that the restoration with satellite kitchen is similar to having own kitchen in reference to the adherence to the

Table II
Adherence to the Mediterranean Diet in each main food group according to different characteristics of university colleges

	Number of residents			Type of Restoration			Population by Gender			P
	< 100 % Adequacy [n]	> 100 % Adequacy [n]	P	Own kitchen % Adequacy [n]	Satellite kitchen % Adequacy [n]	P	Mixed % Adequacy [n]	Male % Adequacy [n]	Female % Adequacy [n]	
Dairy products	53.8 [21]	52.4 [65]	0.876	55.2 [79]	35 [7]	0.089	37.0 [10]	56.7 [55]	53.8 [21]	0.192
Lean meats, Poultry, Eggs	2.6 [1]	1.7 [2]	0.720	2.2 [3]	0 [0]	0.539	11.1 [3]	2.2 [2]	2.6 [1]	0.743
Fish	30.8 [12]	22.3 [27]	0.285	25.5 [36]	15.8 [3]	0.353	30.8 [8]	20.0 [19]	30.8 [12]	0.297
Cereals, potatoes	28.2 [11]	15.4 [19]	0.074	19 [27]	15.0 [3]	0.665	14.8 [4]	15.6 [15]	28.2 [11]	0.202
Legumes	7.7 [3]	45.5 [56]	0.000	37.3 [53]	30.0 [6]	0.524	25.9 [7]	51 [49]	7.7 [3]	0.000
Dried Fruits	10.3 [4]	10.5 [13]	0.968	10.5 [15]	10.0 [2]	0.947	7.4 [2]	11.3 [11]	10.3 [4]	0.839
Fruits	53.8 [21]	12.9 [16]	0.000	22.4 [32]	25.0 [5]	0.779	22.2 [6]	10.3 [10]	53.8 [21]	0.000
Vegetables	89.7 [35]	50 [62]	0.000	56.6 [81]	80.0 [16]	0.046	74.1 [20]	43.3 [42]	89.7 [35]	0.000
Snacks	2.6 [1]	17.7 [22]	0.017	13.3 [19]	20.0 [4]	0.427	18.5 [5]	17.5 [17]	2.6 [1]	0.057
Fatty meats, Sausages	30.8 [12]	23.4 [29]	0.354	23.8 [34]	35 [7]	0.279	40.7 [11]	18.6 [18]	30.8 [12]	0.041

Values are expressed as percentage and number of persons who follow the recommendations of Mediterranean diet for each main food group. Significance level (P) was fixed at 0.05.

recommendations, inasmuch as both type of restorations have professionals in nutrition who prepare the menus for the university residences. Lastly, the gender of the students who lived in the colleges had some influence on following the Mediterranean diet recommendations proposed by SENC. Particularly, there are significant differences in consumption of legumes, fruits, vegetables and fatty meats and sausages. The pattern of legumes consumption was more suitable in male colleges, while in female colleges the consumption of fruits and vegetables was more suitable than in other types of colleges, and in mixed colleges the consumption of vegetables and fatty meats and sausages was also more appropriate. This may be because there are documented differences by gender in food choices among young population^{28,29}.

The current work presented several limitations. The first one is the cross-sectional design of the study, which did not permit to establish casual relationships; secondly, the results of the food frequency questionnaire must be interpreted with caution because this information was self-reported by the participant students. Furthermore, the relatively small sample size does not allow the results to be generalized, although the trend in adherence to the Mediterranean diet was similar to that found in other studies conducted elsewhere in university youth.

Conclusion

The present findings support the idea that the young Spanish population is moving away from the Mediterranean diet. Hence, it would be most important and necessary to develop strategies in order to publicize the benefits associated to following this dietary pattern, so that people can return to the traditional eating habits as they did years ago.

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